

separated. A grain of wheat consists of (1) an outer envelope or husk, which constitutes the bran, (2) the kernel or endosperm, and (3) the germ (see Fig. 1). The husk has an outer cuticle from which delicate hairs spring (Fig. 3), under which are three other layers, the two outer consisting of elongated cells (Fig. 2, *a*), the third of well-defined rounded cells (Fig. 2, *b*). Then comes the envelope of the seed proper, the "testa" or "episperm," under which is a layer of large quadrilateral "cerealins" cells (Fig. 2, *c*), which encloses the endosperm; the latter consists of numbers of large cells with delicate walls filled with starch granules (Fig. 2, *d*). The husk, constituting the bran, consists mainly of cellulose with pigment and

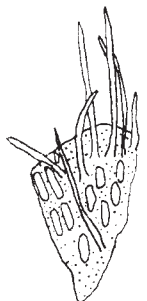


FIG. 3.—Outer cuticle with hairs of grain.

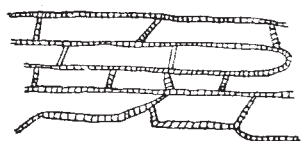


FIG. 4.—Inner skin or epicarp of grain.

mineral salts, the endosperm consists largely of starch, and the germ, relatively a small portion of the whole, is rich in protein and fat. In the process of milling the grain is broken up and various "mill products" are obtained. The outer coats yield bran, fine pollards, sharps, and middlings, the germ is removed as offal, while ordinary flour is derived almost solely from the endosperm. The flour itself is divided into a larger portion, "bakers" or "households," and a smaller, very white and poor in protein, known as "patents," from which genuine Vienna bread and the best class of fancy breads and pastries are made. The semolina, derived from the central part of hard wheat, and rich in gluten, is also lacking in white flour.

It will thus be seen that ordinary white flour and white bread made therefrom contain little or none of the bran, germ, and semolina, and valuable food con-

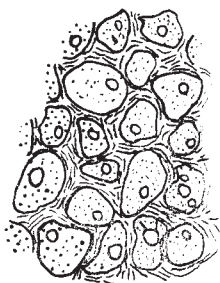


FIG. 5.—Large-celled endocarp layer of grain.

stituents—mineral matter and protein of the bran and semolina, and fat and protein of the germ—are lost. Wholemeal bread is therefore richer in the nutritive constituents and has more flavour, but is darker in colour than white bread, owing partly to the inclusion of the bran and partly to an interaction by which

dextrin and sugar are formed which undergo darkening in the oven. Wholemeal bread is, however, apt to be irritating on account of the cellulose and silica of the outer coat, but by removal of the outer layers of the husk the irritant material may be excluded, and the valuable mineral, protein, and fatty constituents of the inner branny coat, semolina, and germ, are retained. Such a flour constitutes the "80 per cent. flour" employed in making the so-called "standard" bread. The term "80 per cent. flour" means that a wheat a bushel of which weighs 64 lb. yields 80 per cent. flour. In the old method of milling the wheat is ground between stones, the flour being separated by sifting, and in this way some of the "offal" is retained; hence the term "stone-ground."

"Standard" bread is distinctly cream-coloured, and contains pale brown particles derived from the branny coats of the grain. It has more flavour and is moister than ordinary white bread, and contains more phosphates and other mineral salts. Microscopically various branny constituents can be recognised, *e.g.* cuticle with hairs (Fig. 3), inner skin or epicarp (Fig. 4), and large-celled endocarp layer (Fig. 5), and these figures are reproduced from actual drawings of a sample of "Standard" bread examined. There is doubtless some difference of opinion as to the relative values of ordinary and "Standard" flour, and the bread made therefrom. The roller mills cleanse the wheat in a very efficient manner. Chemical analysis, except as regards salts, shows little difference between the two; "standard" bread may even be slightly poorer than ordinary bread in protein, owing to the greater percentage of moisture. On the whole, however, we think there can be little doubt that "Standard" flour and bread are to be preferred. Their use will also tend to revive wheat growing and the small miller in England.

#### THE HOME LIFE OF THE SHANS.<sup>1</sup>

THE Shan States under the control of the Government of Burma form two groups, the northern and the southern, separated for some distance by the Nam Tu or Myitnge River in the eastern portion of the province. Ethnologically, the Shans are a branch of the great Tai people, "the free," who at present exercise sovereignty only in Siam. The affinities of the branches of this people are obscured by the bewildering variety of names which disguises their identity, while the dialects are mutually incomprehensible, and, as if this were not enough, are recorded in at least six forms of written character. Even the origin of the name Shan is a puzzle, the only reasonable explanation being that of Sir J. G. Scott, who points out that they were known to the Burmese as Tarok or Taret, and possibly gained their present title from their Chinese designation, Han Jen. Our knowledge of them is derived from the accounts of earlier travellers like Dr. Richardson, Captain Macleod, and Sir H. Yule; from the translation of tribal chronicles by Mr. Ney Elias and Sir J. G. Scott, and of Chinese authorities by Mr. G. H. Parker; and, in particular, from the monograph on their history and ethnography written for the Census Report of Burma, 1892, by Dr. J. N. Cushing. In the present book the information thus collected has been carefully summarised in two chapters on tribal history and literature by Mr. W. W. Cochrane.

Mrs. Leslie Milne spent about twenty months in a Shan village with the object of studying the language of the Palaung or Palé, a neighbouring hill tribe who

<sup>1</sup> "Shans at Home." By Mrs. L. Milne. With Two Chapters on Shan History and Literature by the Rev. W. W. Cochrane. Pp. xxiv+289. (London: J. Murray, 1910.) Price 15s. net.

trade with the Shans, but are allied to them neither by race nor language. She is a careful and sympathetic observer, and has profited by information

idyllic conception of their character and beliefs which is prominent in the accounts of Burman life and psychology by enthusiasts like Sir J. G. Scott and Mr. Hall Fielding. The truth is that their views are largely based upon the obvious contrast between the races of Burma and those of the Indian plains. While the latter, mainly owing to the bondage of the caste system, are reticent, suspicious, and unwilling to associate with the foreigner, the former are cheerful, kindly, and beset by none of those taboos of food and personal pollution which in India proper form an effective barrier between the people and their rulers.

Such views naturally lead to exaggeration. In the case of religious beliefs, for instance, Mrs. Milne has failed to grasp the fact that their beliefs are almost purely animistic, and that Buddhism is only a thin veneer concealing the predominant worship of Nats or spirits. It is true, as she observes, that among them "there is no great fear of death; they all feel that they have all lived and died so often that death and its mystery is not talked of in a whisper, but is a favourite topic of discussion in Shan houses." "They place," she goes on to say, "religion and the study of their scriptures, and a temperate life on a higher level than money or the comforts and luxuries that money brings. Their lives are very happy. Any man may marry the girl he loves if he can persuade her that she loves him better than any other man. There is always money enough, and food for the children that come to gladden their homes. Starving people do not exist, and there are few unemployed, because any man or woman may easily earn a livelihood by asking for jungle land, by clearing and cultivating, and by selling the produce that is grown upon it." When British rule was introduced



FIG. 1.—Circles of sand made by Shans in shallow parts of muddy streams, in order to act as water filters. From "Shans at Home."

received from the officials of the American Mission. At the same time, she has not avoided that almost

and cultivating, and by selling the produce that is grown upon it." When British rule was introduced



FIG. 2.—Market Day. From "Shans at Home."



we found them harassed by raids of the neighbouring Kachins and torn by internecine war. Now they are clamouring for roads which will enable them to bring their produce to the railway. It will be interesting to watch how long this almost idyllic social state remains unaffected by the pressure of commercialism.

Mrs. Milne's account of their home life and industries is clear and comprehensive; and the value of her book is increased by an excellent collection of photographs. It is certain to survive as the standard account of a most interesting people recorded at a time when they were little affected by external influences.

#### BELGIUM'S CONTRIBUTION TO THE PLAICE PROBLEM.<sup>1</sup>

THE plaice problem still occupies a prominent position in the foreground of the international investigations. The reason is not that the plaice is the sea-fish which contributes most wealth to the countries concerned. In respect of total value landed the fish is surpassed in England by the haddock, the herring, and the cod, while in Belgium the total value of soles annually landed is more than twice that of plaice, which stands fourth in the list, after haddock and herring.

The reasons why the plaice is of such importance that it has been made the principal object of investigation on the parts of England, Germany, Denmark, Holland, and Belgium are as follows:—

(1) This fish constitutes a proportionately large as well as much appreciated element in the ordinary dietary of the poorer classes in the five countries named.

(2) The livelihood of large numbers of fishermen in these countries depend on their ability to maintain an adequate supply of this fish in the markets.

(3) It is especially in regard to the plaice that the cry of "depletion" of the fishing grounds, and of the undue destruction of undersized and immature fish, has been, and is still being, raised.

(4) The plaice lends itself perhaps more readily than any other fish to protective legislation, on account of its comparatively restricted range, its regular distribution from the coast seawards according to size, and its slow rate of growth.

In view then of the urgent need which was expressed in discussions on the plaice at Royal Commissions and fishery conferences of a satisfactory knowledge of the natural history of the fish on one hand, and for trustworthy statistics showing the actual condition of the fishery in time and space on the other, it is not surprising that the International Council took the matter in hand at the outset of its career and arranged for a thorough investigation of the plaice fisheries both from the biological and from the economic point of view, an investigation in which each of the five countries most interested was appointed a share. The result of the large amount of research which has been expended on the plaice during the past few years is that we now possess a considerable amount of information respecting the movements of the fish at all stages of its career, the age of the fishes, and their growth-rate in different parts of the sea, their age and size at maturity, and so forth, while the sea fishery statistics of the various countries bordering on the North Sea have been so completely reorganised that they now show us, for a quinquennial period at least, something like the actual

<sup>1</sup> Contribution à l'Etude biologique et économique de la Plie. Par G. Gilson. Délégué de la Belgique au Conseil international pour l'exploration de la mer. Travaux de la Station de Recherches relatives à la Pêche maritime. Ostende. Fascicule IV. (Bruxelles: Imprimerie Polleunis et Ceuterick, 1910.)

yield of different fishing grounds from year to year and from month to month.

Although we have no continuous or sufficiently exact statistics of the plaice fishery extending into last century, there can be no reasonable doubt that the condition of the fishery and the composition of the plaice population on the fishing grounds are very different to-day from what they have been in the memory of the older fishermen, and fragmentary statistics of the number of baskets formerly taken are not altogether wanting to show this. If the destruction of an "accumulated stock" of old fishes (such as is to be found in the Barents Sea at the present day, and not so many years ago at Iceland) was inevitable, and quite rational and economic, the same can scarcely be said if the supply of fish at the present day is being maintained at the sacrifice of an increasing proportion of the smaller and much less valuable sizes. If this actually is the trend of the fishery at the present day, then, apart from the possibility of an ultimate shortage of supply which is at any rate threatened, it is obvious that the fishery is not being exploited in a rational way. As Prof. Gilson, in his important memoir, says:—"On sait qu'il faut considérer la capture en grande masse de jeunes plies, inaptes à la reproduction pour la plupart et capable de gagner en une année le double et même le triple de leur valeur, comme une opération anti-économique appelant une réforme."

It is greatly to the credit of Prof. Gustav Gilson, of Louvain, the Belgian delegate to the International Council, that he has been able to carry out a plan of researches in accordance with the international programme, in spite of the great disadvantages attending the lack of a special research steamer able to work on the fishing grounds at all seasons, and of a coastal laboratory where material could be examined fresh and continuously.

The institution in Belgium which has assumed the task of participating in the international investigations is the Royal Museum of Natural History, which maintains a station for sea fishery research at Ostend. Solely with the aid of the resources of this institution and entirely outside the official machinery, Prof. Gilson has reorganised the sea-fishery statistics at Ostend. Previous to 1904 these gave only the total quantities and value of fish landed at the port without distinction of species, size, number of baskets or fishes, place of capture, &c. From 1904 onwards, thanks to Prof. Gilson's efforts, all these and other essential particulars are given in the statistical returns, so that now the Belgian statistics are equally precise and detailed as those of other countries bordering the North Sea.

In the memoir under review the data collected with regard to the plaice landed at Ostend are analysed and coordinated from two points of views:—(1) So as to show the principal features in the evolution of the Belgian plaice fishery during the quinquennial period (1904-8), and (2) to furnish indications of the influence which a raising of the minimal size legally established (18 centimetres) would probably exercise on one hand on the reserves of plaice in the sea, and, on the other, on the product of the fishing industry in weight and value.

It is impossible to indicate all the features in the evolution of the Belgian plaice fishery during the period 1904 to 1908 which are revealed by Prof. Gilson's analysis of the Ostend statistics. It will suffice to point out the most important feature from the point of view of the present discussion. This is to be found in the progressive increase from year to year of the proportion of small fish in the catches of the sailing trawlers, which boats are re-